Introduction
&
Opening Remarks

Chris Markou, Head Operational Cost Management, IATA
Challenges & Opportunities with data from connected aircraft

Moderator: Chris Markou, Head Operational Cost Management, IATA
Rodolphe Parisot, Chief Digital Officer, Air France Industries KLM Engineering & Maintenance
Pierre-Yves Benain, Portfolio Head e-Aircraft, SITAONAIR
Mark Leach, Partner, Bird & Bird
Matthew Evans, VP Digital Transformation, Airbus
Jan Stövesand, Senior Director Analytics & Data Solutions, Lufthansa Technik AG
Aircraft Operational Data
Challenges and Opportunities

Chris MARKOU
Head of Operational Cost Management, IATA

June 25, 2019
What is Aircraft Operational Data

- Data generated during
  - Flight
  - Maintenance
  - Ground Service

- Data from the aircraft and its operations
  - Massive amounts of data per Flight / Aircraft
  - “Cradle to Grave”
IATA’s Role

- Understand how the market and its players are developing
- Work towards maximizing efficiencies using data
- Define and develop data standards as needed
- Addressed all aspects of the data journey
- Ensure that:
  - Airlines are in control of data produced
  - Have choices when selecting providers
  - Allow healthy competition and innovation
Challenges & Opportunities with data from connected aircraft

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Networking Break
Opening Remarks

Chris Markou, Head Operational Cost Management, IATA
A deep dive into the SESAR views on Digitalization

Marouan Chida
Digital Transformation & Innovation Manager at SESAR Joint Undertaking
A deep dive into the SESAR views on Digitalization

Marouan CHIDA
Head of Digital Transformation & Innovation

SESAR Joint Undertaking
The world around us is changing very fast
A yet challenging ATM context

Productivity

45 aircraft per hour is the average European En-route capacity today.

Europe needs 3 times more in the next 15 years (*)

Capacity

In 2040 Lack of capacity means 1.5M flights & 160M passengers will be unable to fly.

7 times more flight will be delayed by 1 to 2 hours. (**)
THE « TECHNOLOGY PILLAR » OF THE European POLICY

SINGLE EUROPEAN SKY REGULATORY FRAMEWORK

EU MASTER PLAN

EUROPEAN ATM MASTER PLAN

- Cost Efficiency
  - Up to 45% reduction in air navigation services costs per flight

- Capacity
  - Up to 30% reduction in departures delays
  - Up to 10% additional flights landing at congested airports
  - A system capable of handling up to 100% more traffic

- Security
  - Ensuring high levels of security

- Cost Efficiency
  - Up to 40% reduction in fuel burn

- Safety
  - Implementation of a new flight path

- Operational Efficiency
  - Up to 15% reduction in flight time

- Environment
  - Up to 10% reduction in CO2 emissions
  - Positive impact on noise and air quality
A Strong public-private partnership
Some of our activities
A pressurised Ait Traffic Management

Key drivers

- Disruptive growth in traffic size
- Automated systems
- Unprecedented level of heterogeneity and complexity

- Tens of millions of digitally connected flights in the airspace in 2050
  - 19 million traditional (IFR) flights
  - 85 million unmanned flights

- Highly automated vehicles
  - Single pilot operations
  - Urban air mobility
  - Cargo drones

- Developments will lead to unprecedented level of heterogeneity and complexity

SESAR ambition/vision

Addressing capacity of controlled airspace requires dramatic transformation

Unprecedented level of heterogeneity & complexity will require further

- Automation
- Connectivity

To ensure a scalable, cost-efficient system with safety at or above current levels

Air and ground automation and integration

Connectivity

Critical dependency on changes in delivery model and airspace design/use
Towards autonomy & automation

SESAR Innovations

Airborne Automation

Cockpit evolution
- Augmented approaches
- Wake vortex detection & avoidance

U-space
- Atomic gyro inertial navigation
- Tracking
- Emergency recovery

Ground Automation

Evolution of the ground system
- Wake separation
- 4D trajectory
- Assistance for surface movement

U-space
- Traffic complexity resolution
- Runway status & surface guidance

Automation Levels
1. Human assistance
2. Partial automation
3. Conditional automation
4. High automation
5. Full automation

Coming Next

Urban air mobility
Single pilot operations
Autonomous cargo
Digital cockpit assistant
Autonomous large passenger aircraft
Digital ground assistant
Emulating U-space
AI powered ATC environment

New standards for safety and security
A Connected and Resilient aviation

SESAR Innovations

Virtualisation

Virtual & augmented reality
- Approach & landing aids for the cockpit
- Visual aids for tower control

Virtual centres
- Rationalisation
- Contingency

Remote tower
- Single airport
- Multi-source surveillance data fusion
- Multiple & large airports

Connectivity

Cockpit evolution
- Multilink management
- Broadband satellite comm. (ESA-Iris)
- Broadband airport comm. (Aeromacs)
- Broadband ground Comm. (LDACS)
- Cellular link for GA/RC

U-space
- Command & control
- Tracking & telemetry
- Vehicle to vehicle
- Vehicle to infrastructure

Data sharing

Collaborative Airport and Network
- Digital Aeronautical Information (AAM-MET)
- Flight object sharing (IOP)

System-Wide Information Management (SWIM)
- Yellow profile for Web Services
- Blue profile for Flight Data
- Purple profile for Air/Ground Advisory Information Sharing

Cloud based drone information management

Coming Next

Defragmented European Sky
- All weather operations
- Pan European service provision capability

CNS as a service
- Fully dynamic airspace
- Resilient operations
- Pan European mobility of staff

Hyper connectivity for high automation
- Next generation links
- Internet of Things for aviation

Future Data services and applications
- Interconnected Network
- Passenger centric ATM

Advanced analytics for decision making
- Open Data
- Multimodality

New standards for safety and security
A transformation of the whole architecture
A major transformation of the whole ecosystem

Current system
- Monolithic
- Product Oriented
- Narrow Supply Base

Future system
- Distributed
- Service oriented
- Wide Supply Base

Human at the epicentre of information integration

Automation at the epicentre of information integration
New paradigm: digital and connected ecosystems
Thank you very much for your attention!
Case studies and solutions for data sharing

Nigel Howard, Partner, Covington & Burling
This presentation represents the speaker’s own personal views

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• Technology and data transactions lawyer  
• 20 years of experience in the aviation industry  
• Experience includes:  
  • data protection and sharing strategies  
  • analytics and visualization  
  • personalized digital marketing

Notice: The views expressed in this presentation are my own. They are not intended to represent the views of the law firm of Covington & Burling LLP or any firm client. This paper is for general informational purposes only, and it is not intended to be and should not be taken to be legal advice. Moreover, this paper identifies some key considerations and does not purport to identify all considerations or discuss any particular consideration in detail. Logos, trade names, trademarks and service marks of companies appearing in this presentation are the property of their respective holders, are reproduced for information purposes only and do not indicate any endorsement of the views in this presentation.
Case Studies and Solutions for Data Sharing

- Common Structures
- Case studies
  - Flight Safety and Operations
  - Other Industries
- Lessons Learned and Solutions
- Discussion

Organizations need data governance functions and policies
Common Structures for Data Sharing

- Mutually beneficial data partnerships
  - Data co-ops and data commons
- Innovator data partnerships
  - Innovator company is the catalyst
- Channel data partnerships
  - Affiliate programs
  - Reseller programs

Structures are from the book “Data Leverage: Unlocking the surprising growth potential of data partnerships” Christian J. Ward and James J. Ward
Case Studies – Flight Safety

- Global Safety Information Project
  - Toolkits, webinars and podcasts
  - SKYbrary
- ICAO Global Aviation Safety Plan
  - Symposia and workshops
  - iSTARS API Data Service
  - USOAP Continuing Monitoring Analysis
- Aviation Safety Information Analysis and Sharing (FAA)
- Data4Safety (EASA)

Airplane graphic is from ICAO Safety Report 2018 Edition
Case Studies – Flight Operations

- Innovator data partnerships

- Potential for better management of aircraft events & ops
- Need to address 3Cs - control, compliance, commercial
Case Study – Other Industries – Financial Data

Bloomberg

- Data Innovator with Data Channel Partners
  - aggregates financial data from thousands of sources
  - cleanses, normalizes, and enriches data + offers analytics
  - resells data through a variety of licenses and distribution channels

- Resources + Chief Data Officer
  - thousands of analysts, engineers, and other data personnel
  - human and technology resources devoted to data rights compliance
Case Studies – Other Industries – Health Data

- Health Level-7 standard for clinical data exchange
- HL7 International is non-profit Standard Developing Organization with paid membership

- Initiative to collect 1M+ patients’ genetic samples
- Voluntary enrollment, patients receive data & reports
- Research portal with differing levels of access
- No government / law enforcement access

- “Public Data Set” of de-identified data
- Licensed to anyone for public health research
- Other research – Committee review required
Case Studies – Other Industries – Music Industry

Performing Rights Organizations (PROs)

- Challenge – numerous rights holders; difficult to license songs
- Solution – PROs (ASCAP, BMI, SESAC) grant blanket licenses for their entire music catalog
- Collect and distribute royalties
- Monitor licensee compliance
- But new technology allows for collection of actual usage data
  - should licensing change?

Image Source: https://www.soundstr.com/consent-decree-infographic/
Lessons Learned - Flight Safety

- Established SMS and mutual benefit led to partnerships
- Protection for individuals and organizations has been key
  - De-identification
  - Immunity
- Engagement of regulators and international bodies
- Constant need for improvement
  - IoT and data volumes provide opportunities/challenges
Employ mechanisms to monitor compliance with data policies and obligations and respond to actual or suspected violations.

**Data Culture/Organization**
Need a culture and framework that encourages and facilities quality, usage and organization of data.

**Compliance/Rights Management**
Establish a framework for managing rights and compliance with contractual and other legal obligations.

**Security**
Implement appropriate security and incident response mechanisms.

**Integrity/Data Ethics**
Consider accuracy, integrity and reliability of data, and ethical considerations pertaining to data collection and usage.

**Explanations**
Consider mechanisms for communicating to stakeholders the intended uses of the data and relevant information pertaining to the data.

**Monitoring & Response**
Employ mechanisms to monitor compliance with data policies and obligations and respond to actual or suspected violations.

**Lessons Learned – Other Industries**

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data management best practices

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Lessons Learned – Other Industries

- Data management is not enough, also need **business optimization**
  - Leadership
  - Resources
  - Policies
- Mutual benefit partnerships take time and planning
- Innovator and channel data partnerships have great potential
  - but need balanced solutions for
    - control
    - compliance
    - commercial value
Proposed Solutions

- Add leadership + a team
  - Chief Data Officer
  - Multi-disciplinary experience

- Create data governance policies
  - Collection, including managing data quality and standardization
  - Protection
  - Sharing
    - internal
    - external
  - Enforcement
Thank you

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Use of the Blockchain technology to improve aircraft operations

Martin Mitev, Captain & Assistant SVP Flight Operations, airBaltic
Blockchain in Flight Operations

By Martin Mitev
Airline Captain
Assistant to SVP Flight Operations
Flight Operations Futurist
TOC

• Focus
• Assets
• Status Quo 10 mins
• Technology
• Adoption 15 mins
• Use Cases
• Challenges 25 mins
• Takeaways 30 mins

8 Slides

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Flight Operations’ Core

• What is Flight Operations in this context?
  • Using aircraft. (ICAO, 2019).
  • That includes preparing it, crewing it, flight planning, operational execution, and post-flight maintenance.

• What is Flight Operations obsessed with?
  • Safety
  • Efficiency
  • Data Integrity (Audits)
Assets
The “Just Fine” Status Quo
**What Is a Blockchain?**

**Requirements:**
- One source of truth
- Records created once
- Multiple writers
- Trust between them
A Has-Been Had

Year 0: Concept proposed
Year 5: Two individual nodes connect
Year 9: First info exchange
Year 11: First app
Year 13: First monetized access, concept enhancement proposed
Year 18: Second widespread app (First Flight Operations App)
Year 21: Enhanced concept established and widely adopted
Year 22: Expanded functionality established and widely adopted
Year 25: User growth and substitution
Year 29: Ultimate ease-of-communication app created (European ATC coordination app)
Years 35+: Transformation and millions of dollars made (ATC control app in year 35, Flight planning app in year 40)

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What’s a Blockchain Future Look Like?

**Substitution**
- Flight planning
- Aircraft Maintenance Processes
- Aircraft Parts Processes (incl. 3D printed ones)
- Cargo Processes
- Payments without an intermediary: overflight charges, employee work, in a variety of currencies (cash, FFP)
- Regulatory documentation work with civil aviation authorities
- Delay management

**Transformation**
- Entire flight is one chain, a single source of truth in the cloud (incl. UAS, air taxi)
- Machine-to-machine automated utilization settlements
- Autonomous regulatory compliance (or the CAA is no longer required)
- Airplane rental without brokers
- Microcharters, or an “airline-for-a-day” concept
- Automated operational reputation tracking

**Single Use**
- Pilot logbooks
- Payments in cryptocurrency between two parties: aircraft rental, fuel, de-icing
- Individual flight’s times reconciliation
- Allowing an authority to view manuals and certificates
- Maintenance record storage

**Digital Twin**
- Internal technical logs
- Internal regulatory compliance tracking
- Baggage tracking within an airport
- Dangerous goods compliance processes
- Drone deliveries flight planning and execution
- Payments within a parent and daughter companies (e.g. an airline and its FTO).
- ADS-B security

**Localisation**
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Source: Adapted from (Iansiti and Lakhani, 2017)
What’s a Blockchain Future Need?

• Human talent.
• A strategy.
• One data standard. The means to ingest existing data into this schema.
• Trust through a “working together” model.
• A number of fully operationalized, scaled-out deployments running for several years.
• More dapps than “smart contracts”, solving throughput and scalability challenges.
Kids Don’t See the World with History Attached

• Implementations take time. Stable ones take even longer.
• Pick a single use case. Minimise risk.
• Consider how blockchain relates to other value-generating technologies (IoT for instance).
• It might happen to you if you don’t want to tinker with it.
• Coordinated action.
• Once on your way, would you be willing to revert to paper?
Networking Dinner

Buses depart from the Lobby area at 19:00 sharp
IATA AVIATION DATA SYMPOSIUM
ATHENS, GREECE 25 – 27 JUNE 2019
SAFETY & FLIGHT OPERATIONS